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REMARKS

Claim Rejections - 35 USC §102

Claims 1-3, and 7 are rejected under 35 U.S.C. §102(b) as being anticipated by Long et al. (U.S. Patent No. 6,306,710 B1, hereinafter "Long").

Long discloses a gate structure of a MOSFET formed to have a longer length toward the top of the gate structure such that a spacer having a substantially rectangular shape is formed at the sidewalls of the gate structure. For fabricating a gate structure of a field effect transistor on a semiconductor substrate, a layer of gate structure material is deposited on the semiconductor substrate. The composition of the layer of gate structure material is adjusted along a depth of the layer of gate structure material for a slower etch rate toward a top of the layer of gate structure material that is further from the semiconductor substrate. The gate structure is then formed by patterning and etching the layer of gate structure material. The slower etch rate toward the top of the layer of gate structure material results in a longer length toward a top of the gate structure that is further from the semiconductor substrate. A spacer dielectric is deposited conformally on exposed surfaces of the gate structure. The spacer dielectric is anisotropically etched such that the spacer dielectric remains on sidewalls of the gate structure. The longer length toward the top of the gate structure results in a substantially rectangular shaped spacer dielectric remaining on the sidewalls of the gate structure.

Regarding claim 1, Applicants respectfully traverse the rejections since the Applicants' claimed combination, as exemplified in claim 1, includes the limitation not disclosed in Long of:

"forming layers of gate dielectric material, gate material, and cap material on a semiconductor substrate;
processing the cap material and a portion of the gate material to form a cap and a gate body portion;" [underlining for clarity]

The Examiner states in the Office Action of 7-5-05 (hereinafter the "Office Action"):

"Long anticipates...in fig. 15, cap material 296 on a semiconductor substrate;

in fig. 15, processing the cap material...to form a cap..." [underlining and deletion for clarity]

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However, the Long material 296 of Long FIG. 15 is well known to those having ordinary skill in the art as an insulating oxide, interlayer dielectric layer (ILD), 296 as described in Long col. 9, lines 18-20:

“Field oxides 296 may also be deposited for electrical isolation of the components of the MOSFET.”

Those having ordinary skill in the art know that a cap is the topmost layer in a stack and not an intermediate ILD. The term “cap material” does not read on the Long interlayer material 296.

In the present invention, it may be seen that the cap defined as a topmost layer used for etching a gate body portion as disclosed in Specification page 3, line 30, through page 4, line 2:

“A mask (not shown) has been deposited and processed for the etching of the cap material layer 108 to form a cap 200. The cap 200 is used as a mask for the etching of the gate material layer 106 to form a gate body portion 202 with a gate thin layer portion 204 of gate material still remaining over the gate dielectric layer 104.” [underlining for clarity]

The CAFC in the recent case of Phillips v. AWH Corp. 03-1269, -1286 (Fed. Cir. July 12, 2005) (*en banc*) stated that the Specification provides the meaning of claim terms:

“[O]ur cases recognize that the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor’s lexicography governs. See CCS Fitness, Inc. v. Brunswick Corp., 288 F.3d 1359, 1366 (Fed. Cir. 2002). ... the inventor has dictated the correct claim scope, and the inventor’s intention, as expressed in the specification, is regarded as dispositive. See SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc. 242 F.3d 1337, 1343-44 (Fed. Cir. 2001).

It is respectfully submitted that the case law holds what is described in the specification is considered part of the claimed limitation where a defined term, such as “cap layer”, is involved. In All Dental Prodx, LLC v. Advantage Dental Prod., Inc. No. 02-1107 (Fed Cir. Oct. 25, 2002), the appeal centered on the claim term, “original unidentified mass”.

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Based on the above, those having ordinary skill in the art would recognize that Long does not disclose a cap material layer or a cap as claimed. Thus, claim 1 is allowable under 35 U.S.C. §102(b) as not being anticipated by Long because:

"[C]laims . . . are to be given their broadest reasonable interpretation consistent with the specification, and . . . claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Bond*, 910 F.2d 831, 833 (Fed. Cir. 1990); *accord Bass*, 314 F.3d at 577 ("[T]he PTO must apply the broadest reasonable meaning to the claim language, taking into account any definitions presented in the specification."), cited in *In re American Academy of Science Tech Center*, CAFC 03-1531, May 13, 2004.

Further regarding claim 1, Applicants respectfully traverse the rejections since the Applicants' claimed combination, as exemplified in claim 1, includes the limitation not disclosed in Long of:

"processing the cap material and a portion of the gate material to form a cap and a gate body portion;

forming a wing on the gate body portion from a remaining portion of the gate material;" [underlining for clarity]

The Examiner continues in the Office Action:

"[Long anticipates]...in fig. 15, processing...a portion of the gate material to form...a gate body portion;

in fig. 6, forming a wing, width of 222 to the bottom of 230, on the gate body portion from a remaining portion of the gate material, col. 5, lines 42-53;...;" [underlining and deletions for clarity]

However, it is respectfully submitted that FIG. 15 shows the completed device with no processing of the gate material. Further, Long FIG. 6 uses only one step for forming a gate body portion so there is no step of forming a wing. This is disclosed in Long FIG. 6 and col. 5, lines 32-41:

"Referring to FIGS. 3, 6, and 7, with the concentration profile 232 of FIG. 7, the concentration of the dopant is higher toward the bottom 216 of the layer of gate structure material 206 and is lower toward the top 212 of the layer of gate structure material 206. With such a concentration profile 232 of FIG. 7, the layer of gate structure material 206 etches faster toward the bottom of the layer of gate structure material 206 and etches slower toward the top 212 of the

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layer of gate structure material 206. Thus, the gate structure 230 of FIG. 6 has a longer length 222 toward the top 212 of the layer of gate structure 230 such that the gate structure 230 is substantially T-shaped."

Thus, Long does not disclose processing to form a gate body portion and forming a wing on the gate body portion from the gate body portion.

Based on all of the above, it is respectfully submitted that claim 1 is allowable under 35 U.S.C. §102(b) as not being anticipated by Long.

Regarding claim 2, this dependent claim depends from independent claim 1 and is believed to be allowable since it contains all the limitations set forth in the independent claim from which it depends and claims unobvious combinations including forming the wing in claim 2, which includes the step of rounding the outside edges, because Long does not have the claimed step of forming the wing.

Regarding claim 3, this dependent claim depends from independent claim 1 and is believed to be allowable since it contains all the limitations set forth in the independent claim from which it depends and claims unobvious combinations including forming the lightly-doped source/drain region additionally using the first spacer.

It is respectfully submitted that it would be obvious to those having ordinary skill in the art that the Long spacer 262 is used for doping the heavily-doped source and drain 272 and 274 as shown in Long FIG. 13 and not a lightly-doped source/drain region.

Regarding claim 7, this dependent claim depends from independent claim 1 and is believed to be allowable since it contains all the limitations set forth in the independent claim from which it depends and claims unobvious combinations including forming a metal contact over the gate body portion.

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It is respectfully submitted that Long element 286 is a silicide, not a metal, contact as disclosed in Long col. 8, line 62:

"A gate silicide 286..." [deletion for clarity]

Based on all of the above, it is respectfully submitted that the independent claim 1, and the respective claims 2-3 and 7 depending therefrom, are not anticipated by Long under 35 USC §102 because:

"Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, *arranged as in the claim.*" [emphasis added] Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co. (730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984)(citing Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 220 USPQ 193 (Fed. Dir. 1983)))

Claim Rejections - 35 USC §103

Claims 4-6 are rejected under 35 U.S.C. §103(a) as being unpatentable over Long et al. (U.S. Patent No. 6,306,710 B1, hereinafter "Long") as applied to claims 1-3, and 7 above, and further in view of Chakravarthi et al. (U.S. Patent No. 6,797,593 B2, hereinafter "Chakravarthi").

Long has been summarized above.

Chakravarthi discloses methods for fabricating MOS type transistors, in which multiple drain extension implants are performed using different dopant species of the same type. The implanted drain extension dopants are activated using separate anneal processes to provide active dopants of both species throughout the drain extension regions adjacent the transistor channel.

Regarding claims 4-6, these dependent claims respectively depend from independent claim 1 and are believed to be allowable since they contain all the limitations set forth in the independent claim from which they depend and claim additional unobvious combinations thereof.

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In addition, for the reasons given for claim 1, Long does not contain the claim limitations that would make it a viable reference under 35 U.S.C. §103(a) because:

“[T]he prior art reference (or references when combined) must teach or suggest **all** the claim limitations.” [bold for emphasis] *In re Vaeck*, 947 F2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)

Further with regard claim 4, it is respectfully submitted that the combination of Long and Chakravarthi, taken as a whole would be inoperative. It would be obvious to one having ordinary skill in the art that the multiple spacers of Chakravarthi FIGs. 5C through 5F would move the implantations of Long FIGs. 8 and 9 out from the gate and prevent the Long lightly-doped source and drain from being formed under the Long gate.

Thus, claim 4 is believed to be allowable under 35 U.S.C. §103(a) based on Long in view of Chakravarthi because:

“If references taken in combination would produce a “seemingly inoperative device”, we have held that such references teach away from the combination and thus cannot serve as predicates for a prima facie case of obviousness.” *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)[deletion for clarity]

Claims 5-6 have been addressed above.

Further regarding claims 4-6, the Examiner continues in the Office Action:

“Chakravarthi gives motivation [for the combination] in col. 2, line 64 - col. 3, line 15. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Chakravarthi's process with Long's invention would have been beneficial because it forms an improved drain extension.”

Applicants respectfully disagree. As explained above for claim 4, the multiple spacers of Chakravarthi would prevent the Long FIG. 8 and 9 implantations of the drain pocket 242, the source pocket 244, the drain extension 252, and the source extension 254. Thus, there would be no “improved drain extension.” Therefore, taking Long and Chakravarthi as a whole, there is no motivation for the combination and claims 4-6 are allowable under 35 U.S.C. 103(a) because the CAFC has held that the conclusion of obviousness may not be made from common knowledge and common sense of a person of ordinary skill in the art

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without any specific hint or suggestion in a particular reference. *In re Sang-Su Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002).

Claims 8, 9, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Long et al. (U.S. Patent No. 6,306,710 B1, hereinafter "Long") in view of Wolf et al. (Silicon Processing for the VLSI Era, V. I, pp. 191-4, hereinafter "Wolf").

Long has been summarized above.

Wolf discloses silicon nitride has a high dielectric constant making it less attractive for interlevel insulation because of the resultant higher capacitance between conductor layers.

With regard to claim 8, as explained for claim 1, Long does not contain the claim limitations that would make it a viable reference under 35 U.S.C. §103(a) because the resulting combination would not teach or suggest all the claim limitations. *In re Vaeck, supra.*

Further with regard to claim 8, the Examiner states in the Office Action:

"Long does not teach using nitride cap layers or spacers, but Wolf teaches using nitride. Wolf teaches using nitride and gives motivation on p. 191, fourth paragraph. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Wolf's process with Long's invention would have been beneficial because it is nearly impervious barrier to diffusion."

As explained with regard to claim 1, it is respectfully submitted that Long does not teach a cap layer so there is no motivation for using the Wolf nitride to make something that does not exist in Long.

Further, it is respectfully submitted that, assuming *arguendo* that the Long ILD 296 were the cap layer, Wolf teaches away from using silicon nitride because Wolf states in Wolf page 191, third paragraph:

"Silicon nitride also has a high dielectric constant...making it less attractive for interlevel insulation because of the resultant higher capacitance between conductor layers."

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Based on the above, it is respectfully submitted claim 8 is allowable under 35 U.S.C. 103(a) as being patentable over Long in view of Wolf because:

"We have noted elsewhere, as a "useful general rule," that references that teach away cannot serve to create a prima facie case of obviousness..." *In re Gordon, supra*. [deletion for clarity]

Regarding claims 9, 11, and 14, it is respectfully submitted that these dependent claims respectively depend from independent claim 8 and are believed to be allowable since they contain all the limitations set forth in the independent claim from which they depend and claim additional unobvious combinations.

Based on all the above, it is respectfully submitted claim 8 is allowable under 35 U.S.C. 103(a) as being patentable over Long in view of Wolf because of *In re Gordon, supra*.

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Long et al. (U.S. Patent No. 6,306,710 B1, hereinafter "Long") in view of Wolf et al. (Silicon Processing for the VLSI Era, V. I, pp. 191-4, hereinafter "Wolf") as applied to claims 8, 9, and 14 above, and further in view of Chakravarthi et al. (U.S. Patent No. 6,797,593 B2, hereinafter "Chakravarthi").

Long, Wolf, and Chakravarthi have been summarized above.

Regarding claims 10-13, it is respectfully submitted that these dependent claims respectively depend directly or indirectly from independent claim 8 and are believed to be allowable since they contain all the limitations set forth in the independent claim from which they depend and claim additional unobvious combinations.

Further, it is respectfully submitted that the explanations applied to claims 1, 4-6 and 9, 11, and 14 are also applicable hereto and are incorporated by reference thereto.

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Based on all the above, it is respectfully submitted claims 10-13 are allowable under 35 U.S.C. 103(a) as being patentable over Long in view of Wolf and further in view of Chakravarthi because of *In re Gordon, supra*.

Response to Examiner's Arguments

The Examiner stated that Applicant's arguments filed October 5, 2005 have been fully considered, but they are not persuasive.

It is respectfully submitted that the Applicants have clarified and supplemented the Applicants' arguments above. The Examiner's arguments have been addressed below to the extent that they are understood and may be attributed to a given claim.

The Examiner states:

"Applicant argues 1) the Long reference does not teach a layer that meets the cap layer, 2) Long does not process to form a gate body portion and forming a wing on the gate body portion from the gate body wing, 3) the wing portion is not formed from the remaining portion of the gate material, 4) for claim 3, Long does not use the spacer for the lightly-doped source/drain region, 5) for claim 7, Long uses a silicide, not a metal, 6) the §103 combination of Long in view of Chakravarthi is invalid as the multiple spacers would be inoperable, and 7) the §103 combination of Long in view of Wolf is improper since Long does not teach a cap.

Applicants respectfully address each of the points attributed to Applicants by the Examiner. The other points are in the arguments above.

The Examiner states:

For 1) Applicant relies on CCS Fitness Inc. and other case law teaching that the applicant's may use their own lexicography. However, this does not relieve the examiner of an unwaivable duty to interpret claims as broadly as reasonably possible.

Examiner must give claims their broadest reasonable interpretation, MPEP §2111, "During patent examination, the pending claims must be 'given the broadest reasonable interpretation consistent with the specification.' Applicant always has the opportunity to amend the claims during prosecution and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified, *In re Pratter*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969), *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997)." Also see *In re Zletz*, 13 USPQ 2d. 1320 (Fed. Cir. 1989).

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Applicants respectfully disagree with the Examiner. An Examiner may not give a claim term a reading, which is so broad that it is contrary to the plain language of the term. Thus, claim 1 is allowable under 35 U.S.C. §102(b) as not being anticipated by Long because:

“Although the PTO must give claims their broadest reasonable interpretation, this interpretation must be consistent with the one that those skilled in the art would reach.” *In re Cortright*, 165 F.3d 1353, 1358 (Fed. Cir. 1999), cited in *In re American Academy of Science Tech Center*, CAFC 03-1531, May 13, 2004.

The Examiner states:

“Examiner notes that independent claims 1 and 8 are ‘comprising’ claims and may contain any other limitations so long as they do not interfere with the enumerated claims. Examiner further notes that the cap layer of the independent claims has neither material, dimension, or even function specified. As such Long, in fig. 15, structure 286 will fulfill the cap layer requirements.”

Applicants respectfully disagree because the layer is claimed as a “cap” layer not just “a” layer. Thus, the claim limitation of a cap layer does not read on the interlevel layer 286 in Long FIG. 15.

The Examiner continues

“For 2) examiner further notes that there is no temporal constraint in the applicant's claims. Therefore, the cap material could be formed at any reasonable time, such as Long has stated with gate body being processed with a wing structure before the cap layer 286 has been formed.”

The Applicants respectfully agree in part and disagree in part to the above statement because there is no temporal constraint in Applicants' claims; however to clarify, the Applicants respectfully submit that Long has no step of forming a wing from the remaining portion of the gate material.

The Examiner continues:

“For 3) the examiner maintains that the wing is formed from the remaining portion of the gate material. Long in fig. 3, forms the conductive layer 206, and in figs. 5-15, processes the gate material into a gate body portion 230 with the [sic] with the width of 222 in fig. 6. The processing can be, amongst other steps, the etching of the gate material from figs. 4-6, and in figs. 14 -15, forming the sidewall spacers 262.

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The Applicants respectfully disagree. Long FIGs. 3 and 5 or 6 show a single step of processing a gate material 206 into the I-shaped gate of FIG. 5 or the T-shaped gate of FIG. 6. To read the claimed steps of "processing" to form a gate body portion and "forming" a wing on Long would be reading the claim by the double inclusion of elements; i.e., reading two claimed elements on the one element in the reference. This renders the Examiner's reading indefinite and not anticipatory under *Ex parte Kristensen*, 10 USPQ2d 1701 (Bd. Pat. App. & Inter. 1989).

Long FIGs. 14-15 are unrelated to processing and forming the gate or the wing except as relates to saliciding and forming an intermediate interlayer.

The Examiner continues:

"For 4) the spacer 262 of fig. 13 forms the length of the LDD."

The Applicants believe the Examiner is referring to claim 8 and respectfully disagree because it would be obvious to those having ordinary skill in the art that the Long spacer 262 is used to form the deep source/drain because the LDD are formed in Long FIGs. 8-9.

The Examiner continues:

For 5) a silicide is formed with a metal, cobalt or titanium, col. 9, lines 9- 20."

The Applicants are unable to determine what claim(s) the above statement refers to so additional information as to the specific claim(s) is requested.

The Examiner skips 6) at this point, and continues:

For 7) examiner submits that the drawings of both Long and Chakravarthi are heuristic. The thicknesses of the spacers are unspecified or may be optimized. Thus, the spacers may be thin enough for the practitioner to create the multiple implantations, and to function. The combination need not perform better than any other known device, but must merely function.

The Applicants are unable to determine what claim(s) the above statement refers to so additional information as to the specific claim(s) is requested.

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The Examiner continues:

As a rule, obviousness is based upon what the "references takes collectively would suggest to those of ordinary skill in the art." *In re Rosselet*, 146 USPQ 183, 186 (CCPA 1965). Furthermore, one cannot show non-obviousness by merely attacking references individually where the rejections are based on combinations of references. *In re Keller*, 208 USPQ 871 (CCPA 1981); *In re Merck & Co., Inc.*, 231 USPQ 375 (Fed. Cir. 1986).

The Applicants respectfully disagree (assuming this relates to claims 4-6) because Applicants were attacking the lack of all the claimed elements, the teaching away of the references, and the failure of the motivation for the combination presented by the Examiner. This is unrelated to attacking the references individually.

The Examiner continues:

Instead, there must be an absence of "some teaching, suggestion or incentive supporting the prior art combination that produces the claimed invention." *In re Bond*, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). "Just as piecemeal reconstruction of the prior art by selecting teachings in light of [the] disclosure is contrary to the requirements of 35 USC § 103, so is the failure to consider as a whole the references collectively as well as individually." *In re Passel*, 165 USPQ 720, 723 (CCPA 1970).

The Applicants respectfully agree in part with the above to the extent that Applicants have pointed out there is such an absence. Although applicable, Applicants have not yet argued about piecemeal reconstruction.

The Examiner concludes:

For 6) see 1). The other dependent claims are validly rejected since the independent claims are validly rejected."

Applicants respectfully disagree and submit that the rejection of claims 1-14 have been overcome and these claims are allowable under 35 U.S.C. §102 and 35 U.S.C. §103.

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Conclusion

In view of the above, it is submitted that the claims are in condition for allowance and reconsideration of the rejections is respectfully requested. Allowance of claims 1-14 at an early date is solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including any extension of time fees, to Deposit Account No. 50-0374 and please credit any excess fees to such deposit account.

Respectfully submitted,



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Date: December 27, 2005